

**GOLD KING - DAVIS**

**EPITHERMAL**

**GOLD LODE**

**SILVERTON, COLORADO**

**BERNHARD C. KOCH**  
**1990**

tetrahedrite-tennantite that filled fractures in sphalerite crystals (Plate 5b).

#### 3.5.3.1 Telluride Assemblage

The telluride assemblage consists of silver and gold tellurides. These minerals probably precipitated in the order of hessite ( $\text{Ag}_2\text{Te}$ ), petzite ( $\text{Ag}_3\text{AuTe}_2$ ), krennerite ( $\text{AuAgTe}_4$ ), and calaverite ( $\text{AuTe}_2$ ). Free gold probably followed the telluride assemblage.

The sequence of telluride minerals may show a progressive increase in gold over silver availability from the hydrothermal solution (Figure 14). Other telluride minerals such as altaite ( $\text{PbTe}$ ) and wehrlite ( $\text{BiTe}$ ) probably were contemporaneous or may slightly pre-date the main telluride assemblage. Their exact time and space relationships were not determined.

None of the individual telluride minerals were found in euhedral shape. All telluride minerals precipitated in open spaces of milky quartz gangue. The filled cavities are up to 4 mm in diameter.

#### Hessite

Hessite ( $\text{Ag}_2\text{Te}$ ) was recognized in polished section by its characteristic anisotropy and reddish-brown and blue-

gray polarization colors. Thus, hessite is identified as one of the silver-rich tellurides. Apparently, hessite was the first telluride mineral to precipitate. Later, hessite was extensively replaced by other tellurides such as petzite, krennerite, and calaverite (Plate 3h).

#### Petzite

Petzite ( $\text{Ag}_3\text{AuTe}_2$ ) appears to be one of the later telluride minerals. It fills the center of the telluride/gold assemblage and in Plate 3h probably was succeeded by electrum. Figure 14, however, suggests that petzite was possibly precipitated after hessite, but prior to krennerite and calaverite.

#### Krennerite and Calaverite

Krennerite ( $\text{AuAgTe}_4$ ) and calaverite ( $\text{AuTe}_2$ ) probably precipitated after hessite, which both minerals may have partly replaced (Plate 3h). These tellurides represent gold-silver and gold tellurides, respectively. Compared to hessite they bear lesser amounts of Ag but increased amounts of Au. In Plate 3h, hessite and petzite occur paragenetically co-genetic and locally show intimate intergrowth. In addition to their microscopic recognition, krennerite and calaverite were identified by semi-quantitative microprobe analysis (Appendix B).

The Au-Ag-Te compositions of the main telluride minerals and of electrum in the Gold King-Davis deposit are shown in Figure 14. From this diagram it may be inferred that first hessite, then petzite, then krennerite and calaverite, and finally electrum precipitated from hydrothermal solutions.

#### Other Telluride Minerals

Other telluride minerals such as wehrlite ( $\text{BiTe}$ ) and altaite ( $\text{PbTe}$ ) are represented in traces only. Samples that were collected from the Gold King-Davis # 3 level carried traces of wehrlite and altaite in addition to the previously described telluride assemblage. These telluride minerals were detected by semi-quantitative microprobe analysis. The analyzed mineral grains are too small in order to determine any optical characteristics.

In summary, the following sequence of deposition can be described for the mineral assemblage of this third mineralization stage: Tetrahedrite-tennantite and other sulfosalts such as bismuthinite,  $\rightarrow$  telluride assemblage with or without traces of wehrlite  $\rightarrow$  electrum (95 % Au / 5 % Ag) with or without minor, possibly arsenian pyrite, and traces of chalcopyrite and sphalerite.

Following the third stage of mineralization a cooling stage can be recognized that introduced the gangue minerals

of fluorite, quartz, and huebnerite  $(\text{Mn,Fe})\text{WO}_4$ .

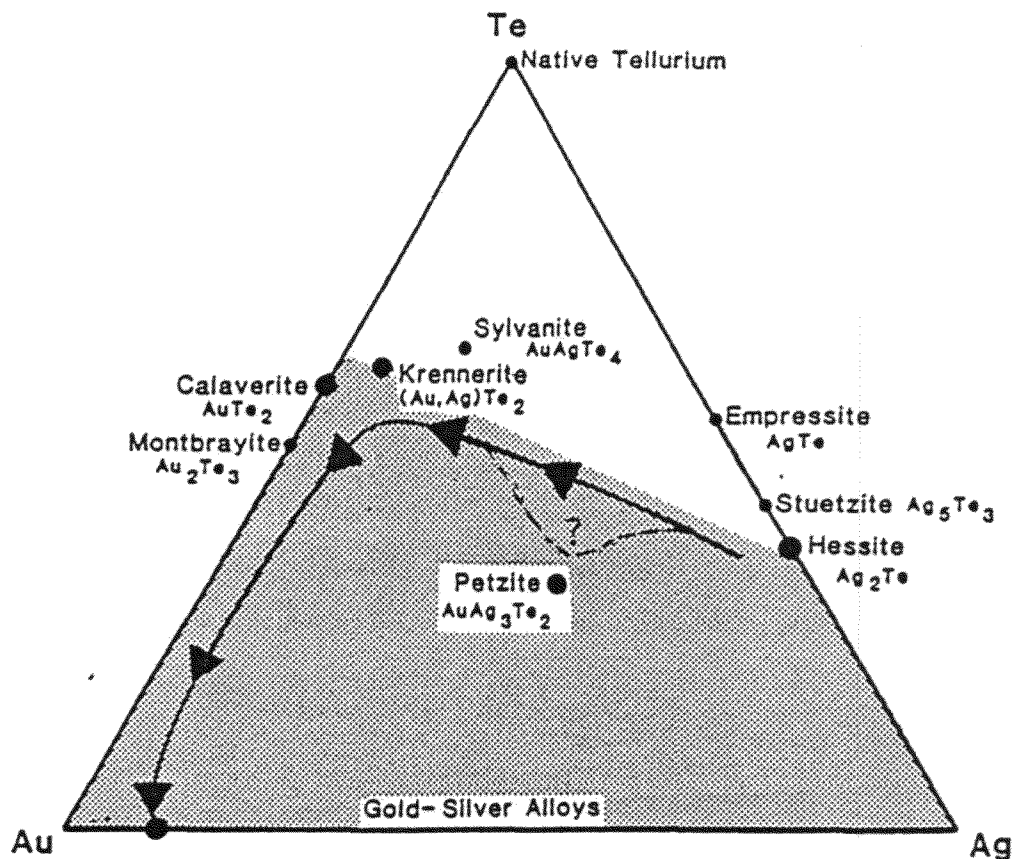


Figure 14: Diagram of naturally occurring Au-Ag-Te minerals. The gray portion in the lower part of the diagram represents the area of the tellurides and gold-silver alloys that occur in the Gold King-Davis vein system. The silver and gold content of the hydrothermal solutions may have changed with time as indicated by the inferred path shown above. Modified from Kelly and Goddard (1969).

## Plate 4

Figure a: Free gold in quartz vein of the main Gold King-Davis lode; penny for scale.

Figure b: Free gold and tetrahedrite-tennantite fill fractures in sphalerite. Sample from the Brooklyn mine, # KGK BM/II; long side of figure equals 0.25 mm.

Figure c: Supergene gold plated along vertical joint in 4-55 flat vein; sample KGK 4-55.

Figure d: Covellite replaces sphalerite; remnants of sphalerite are rimmed by pyrite. Drill core sample GK-11-373'; long side of figure equals 0.65 mm.

Figure e: Horsetail structure in the back of the Gold King vein at # 7 level drift. The structure displays left lateral movement along the Gold King-Davis vein; hammer for scale.

Figure f: Ruptured 2150 vein in the Sunnyside mine. Back of 2150 drift in Sunnyside mine.

## PLATE 4

